THE SCIENCE NEWS-LETTER

A Weekly Summary of Current Science

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WORLD NITRATE SUPPLIES TO SELL AT LOWER PRICES

By Dr. F. G. Cottrell,
Director, Fixed Nitrogen Research Laboratory,
U. S. Dept. of Agriculture.

Nitrates manufactured out of the air, which a decade ago were an intensely national concern of importance chiefly in the destructive business of war, are today an international concern of basic importance to agriculture, discussed by nations only a few years ago at war with each other. America, Belgium, France, Germany, Great Britain, Holland, Italy, Java, Norway and Sweden, at once the chief producers andlargest consumers of artificial nitrates, were represented at an international meeting by scientists and economists whose hope and ambition is mutual cooperation in the capture of more andmore of the vast, scarcely tapped mines of nitrogen in the air all about us, to be chemically fixed and eventually turned into food for the increasing millions of the earth's population.

Through improved methods in nitrogen fixation and a stabilization of marketing, continuing decreases in fertilizer costs to farmers are in plain prospect, it was declared.

Of perhaps even greater importance are the contributions of botanists interested in agriculture. Not contented with merely renewing the natural nitrate supplies in the soil, the agricultural scientists are undertaking programs of "forced feeding" of plants, comparable with the fattening-up processes used in preparing animals for market. Plant physiologists have recently learned that properly calculated overdoses of nitrates will induce plants to produce fruits or heads of grain earlier and in larger quantity than normal. Geneticists are at work in an endeavor to breed new strains that can take up even greater amounts of nitrates than the ordinary breeds of plants now under cultivation are able to use. Professors Erwin Baur and Herman Warmbold of Berlin, and the great Swedish plant breeder Hermann Nilsson-Ehle, declared that a program of several years' experiments could make such "nitrogen-greedy" plant varieties a distinct possibility; and Dr. Karl Bosch of Berlin and Ferdinand Speyer of London stated that the nitrogen industry is planning to spend millions on such research.

Agricultural education in the most advantageous methods of nitrate use has also come in for its share of attention. Especial stress was laid on the desirability of improved methods of distribution of concentrated nitrate fertilizers in regions where transportation facilities are poor, notably in the tropics and in India and China. Improvements in agricultural conditions made possible by the use of cheaper concen-

trates in regions now periodically threatened with famine are expected to go far to avert these calamities, which in the past have not only been a scourge to the afflicted populations but a cause of social and economic disturbances throughout the world.

FUNDAMENTAL DATA OF SCIENCE GATHERED IN NEW VOLUMES

The fundamental facts and figures upon which physical science is built have been brought together and issued for the use of the world in International Critical Tables, the first volume of which has just been issued by the National Research Council and the National Academy of Sciences.

Millions of experiments extending over years of time in the various laboratories of the world were necessary to produce the hundreds of pages of explanations and statistics that will be included in the five volumes of the completed work which are being compiled by the editors with the aidof specialists and experts here and abroad.

The first volume just off the press contains among other valuable information the accumulated data on no less than 9534 different chemical compounds, the new and old facts on radioactivity, and transmutation, astronomical and geodetic data and a comprehensive discussion of the most recent developments inthe field of atomic structure, favorite speculative playground of physicists of the present moment.

Along with the international metric system and a listing of the seventy-four countries in which it is now compulsory are the local systems of weights and measures in use in twenty-five still conservative countries. The measures used by the Pharoahs of Egypt and the ancient Chaldeans may likewise be found side by side with their modern equivalent in feet and meters, gallons and liters.

Thousands of dollars and many hours of time will be saved the research workers of the present and the future by the use of this collection of necessary and essential data on a wide variety of allied subjects in one set of volumes.

GOLD CHANGED TO MERCURY BY GERMAN PHYSICIST

A reversal of the dream of the ancient alchemists, the transmutation of gold into a less valuable metal, mercury, is claimed by Dr. A. Gaschler, an associate of Prof. A. Miethe, who in 1924 announced that he had succeeded in turning mercury into gold.

Dr. Gaschler's process consisted in sealing a gold electrode into a vacuum tube and bombarding it with a stream of positive hydrogen atoms, shot through the tube at high velocity. The resulting color display Dr. Gaschler watched through a spectroscope. At first thehonly light given off was of the color characteristic of glowing hydrogen, but at the end of thirty hours of bombardment the spectrum lines that

indicated the presence of mercury appeared and became stronger as time elapsed.

The experimenter states that an oil pump was used to produce the vacuum, and that every other precaution was taken to prevent the contamination of either the gold electrode or the hydrogen gas with mercury. He is confident that he has actually produced mercury from gold.

Dr. Gaschler calls attention to the similarity of his work to that of a British physicist, J. J. Manley, who succeeded in inducing helium to form a chemical union with mercury by bombarding mercury with a stream of helium atoms. Helium had long been known as one of the most inert of the elements, never forming compounds with any of the others.

He is of the opinion that if his results are confirmed upon further repetitions and refinements, they will lend support to Dr. Miethe and Dr. Hantaro Nagaoka, whose claims that they changed mercury into gold have been subjected lately to skeptical criticism.

DISEASED TEETH THOUGHT CAUSE OF NEURITIS

Bodily ills can sometimes be laid at the door of our already long suffering teeth, Dr. Lewellys F. Barker of Johns Hopkins Hospital has reported to the Maryland State Dental Association.

Closer cooperation between the dental and medical professions is necessary, he declared, to ascertain just how far mouth infections are responsible for disturbances to the general bodily health. Neuritis, several varieties of rheumatism, nephritis, inflammation of the eye and secondary anemias were cited as conditions that frequently appeared as sequels of primary infection in another part of the body.

Dr. Barker considers that there has been a great deal of over-emphasis upon the importance of such focal infections and he scores heavily the present day tendency toward the wholesale removal of teeth without well grounded justification. It is particularly difficult to reach a conclusion in such cases, he said, because the infections of the mouth region are a secondary cause of the accompanying disturbances unlike the diseases where a specific organism is the culprit. There has in consequence been much doubt and speculation and considerable experimentation. This is the reason, according to Dr. Barker, why this field has been so accessible to over-enthusiastic, insufficiently experienced practitioners.

To keep the middle path of sanity between faddish diagnosis and culpable failure of recognition of important disease processes is difficult but necessary, he declared, to every member of either profession. If the public is to reap the fruits of the knowledge that actually exists in regard to the relation of mouth infections to other bodily disturbances, the leaders in both branches must exert to the utmost their protective influence against the practices of certain members of their respective professions.

In the present state of knowledge of the whole subject, he continued, it is very difficult to decide conclusively when a tooth should be removed and when it

should be retained. Both professions should be very cautious to avoid premature application of findings that are not supported by sound observation and experimental evidence.

Dr. Barker cnncludes with a decided rap at what he calls pseudo-research in medicine and its special branches including dentistry. The general haste to rush into print with results that are not sound is harmful to both the public and the less well informed practitioners. The intellect and imagination of the research worker should beof high order and the work should be under the direction of experienced investigators. The mistakes of work so conducted will be fewer and less serious than those of workers of less ability and experience.

The face of the medical profession generally should be set against pseudo-research that is irresponsibly undertaken and is inaccurately conducted, declared Dr. Barker. It is, he said, a degradation to science and misleading to the public that the true scientist tries to serve.

SALMON FOUND GOOD GOITER PREVENTIVE

Canned salmon is the latest addition to the list of "healthy" foods we are urged to eat. N. D. Jarvis and Drs. R. W. Clough and E. E. Clark of Seattle report to the American Medical Association that salmon, both fresh and canned, on account of the amount of iodine it contains, should be as effective a preventive of simple goiter as milk products, fruits and leafy vegetables.

Analysis of various foods undertaken at the University of Washington shows that while several sea foods such as seaweed, oyster and lobsters, have more iodine than salmon, the latter is the cheapest and most available food of a high iodine content on the market.

STATIC RECORDED BY AUTOMATIC INSTRUMENT

Most radio fans are not sufficiently fond of static to want to keep a careful record of it, but since the intelligibility of a radio signal in a receiving set is determined by the ratio of the strength of the signal to the intensity of static, radio engineers want to know its ups and downs.

In a new instrument devised by H. T. Friis, an engineer in the Bell Telephone Laboratories, the static is made to write its own record.

Instead of measuring directly the amount of static, Mr. Friis uses a specially constructed receiving set in which the output, due to the static, is kept constant. This is done by an amplifying system which increases or decreases the amplification according to the weakness or strength of the static. Such a system is necessary, rather than a constant amount of amplification with measurement of the output, because the static varies so greatly in strength. According to Mr. Friis, the change

is generally as much as from one to a hundred in a day andsometimes from one to ten thousand, so that with constant amplification it would be difficult to avoid overloading the tubes.

A fluxmeter, an instrument to measure the quantity of electricity, is connected to the receiving set in place of a loud speaker. When the pointer goes past certain limits, either too high, or too low, an electric contact is made which takes out or puts in some amplification. A pen, connected with a sliding contact that regulates the amount of amplification, writes on a moving strip of paper the line which indicates the amount of static.

Mr. Friis states that the invention of the instrument is too recent to have yet given any comprehensive data, and he suggests that by using a slowly rotating loop antenna in the set, not only the intensity but the direction of the static may be automatically recorded.

HEREDITY AND GLANDS INFLUENCE CANCER

Cancer is caused by the related operation of several factors, rather than by a single cause. This is the conclusion reached by Dr. Leo Loeb of Washington University, after many years of research on breast cancer in mice.

Since 1910 Dr. Loeb has been collaborating with Miss A. C. E. Lathrop of Granby, Mass., on inbred strains of mice in order to determine what effect family predisposition has on the incidence of spontaneous cancer. Recently Dr. Loeb's results have been verified by Dr. C. F. Cori of the Institute of Malignant Diseases in Buffalo.

Briefly Dr. Loeb believes that hereditary disposition, in the case of mammary cancer in mice, plays a very important role in the spontaneous development of the disease, but that heredity alone is not decisive. The presence of certain internal secretions is essential to supplement or cooperate with the animal's innate sensitivity. When these secretions are withheld, the animals do not so readily develop the disease - a discovery that may have important practical bearing on efforts to prevent cancer or at least to lower the cancer rate among human beings.

In dealing with the causes of cancer, the problem always narrows down to the question, what makes this particular group of cells grow so outrageously. Various causes have been and are continually being suggested to account for this misplaced energy, from microorganisms to the psychic condition of "worry". It is known that continued irritation of a mechanical or chemical sort can induce cancer, but the spontaneous development of the disease, the sudden rush of energy, the "will to grow", on the part of a particular group of cells, for no visible reason, is extremely baffling.

Dr. Loeb established the fact that among mice, inbreeding of different strains produce families with distinctly different degrees of susceptibility to cancer of the mammary gland, which is the most common form of cancer among mice. He felt convinced, therefore, that heredity plays an important role in the spontaneous

appearance of cancer among mice and, in all probability, that it also plays an important role in cancerincidence among human beings although the usual statistical methods fail to reveal the importance of heredity. Dr. Loeb found that some mice families showed as high as 60 or 70 per cent. cancer rate while others showed only 4 or 5 per cent. or even less. He found, however, that the hereditary influence could be checked in female mice by cutting off the supply of internal secretion from the ovary. The normal growth of the mammary gland is dependent upon the hormone from the ovary and similarly the excessive, abnormal growth of cancerous tissue in the mammary gland is influenced by the ovary secretions. By removing the ovary at the age of six months or less, just after the mouse is sexually mature, Dr. Loeb was able to lower very decidedly the cancer rate. In strains where the normal rate was 60 to 70 per cent. the castrated mice showed a rate of only 11 per cent.

Dr. Loeb concludes that the causes of cancer are complex and that the balance of different factors, hereditary sensitivity and the supply of internal secretions, beside whatever external stimuli may be applied, must be studied quantitatively in order to give greater insight into the cause and prevention of the disease.

AMERICAN SEEKS SOURCES OF OLD PERSIAN TALES

Armed with a knowledge of six languages and a camera, Prof. Martin Sprengling, University of Chicago Arabist, will penetrate the historic birthplace of the Arabian Nights Tales this summer, and obtain first-hand some of the most ancient legends known to man. He is to give particular attention to the fables of Kalila and Dimna, older than the Thousand and One Nights themselves, and source material for the modern Uncle Remus Tales. Many of the stories which he plans to bring to light have been lost to civilization for centuries, and contain rare bits of humor, adventure, and romance.

The principal work of the expedition will consist of collecting, editing in Arabic, Persian, or Syriac, and translating into English, this group of stories. Prof. Sprengling has already in his possession hundreds of manuscripts upon which these tales have been preserved, either in Arabic or in Persian. He regards the collection as incomplete, and his proposed expedition is being planned in order to make it as complete as possible.

Tradition has it that the Kalila and Dimna stories originated somewhere in India, where they were woven by wise men who instructed the princes of India in the ways of government. These were brought to Persia by a learned physician, and from the courts of Persia they were disseminated to all parts of the world, and became incorporated in the literatures of many nations. As many as thirty-eight different countries are said to have traces of this literature. The most popular children's bed-time stories had their origin in Persia.

Prof. Sprengling will first go to Paris, thence to Italy, and from there to the Near East. He plans to visit the leading bazaars, private homes, museums, universities, and curio shops in his search for original manuscripts and authentic copies of these legends. He will probably return to Chicago some time in October.

EXCAVATION OF PREHISTORIC AMERICAN CITY TO BE CONCLUDED

A last attempt to excavate and study the ruins of Pueblo Bonito, in New Mexico, will be made this summer by an expedition of the National Geographic Society, headed by Neil M. Judd, of the National Museum. The expedition, which has been working at this prehistoric American metropolis for the past five summers, set out for Pueblo Bonito about the fifteenth of this month.

Pueblo Bonito - "the city beautiful" - is the literal meaning of the Spanish words - was a huge four story apartment house containing at least 800 rooms, and was one of the most important centers of civilization in this country at some distant time before the coming of Columbus. Scientists are still hoping to find evidence to reveal the dates at which the ancient civilization flourished.

"The expedition does not hope to complete all the work that might be done at this archeological site," said Mr. Judd. "We are simply bringing the excavations to a close, though many desirable lines of investigation stretch out from these ruins, leading even into Mexico. These prehistoric Indians were trading with Mexico and the Pacific coast before horses or any beasts of burden were known in this country."

The expedition is trying to make a ground plan of the old city that first occupied the Pueblo Bonito site, and over which the later city was built, Mr. Judd stated. Fragments of the walls of the older rooms are found in some cases as much as 12 feet below floors of the later construction.

Pueblo Bonito is part of the Chaco Canyon National Monument. Although it is 100 miles from the nearest town and reached mainly over trails in the open plains, an increasing number of visitors is attracted to it each year, Mr. Judd has found.

"This year will see 500 or more visitors," he prophesied. "And after this year, when work on the site is stopped and the 11 members of the expedition and 75 or 100 Indian workers at the ruins are no longer drawing on the water supply conditions will be more suitable for tourists and undoubtedly there will be many visitors."

MORE SPEED FOR TYPISTS IS FRENCH AIM

That the flying fingers of the typist might get more speed out of a machine with less fatigue of nerves and muscles is the conviction of French psychologists who are studying ways of improving the typewriter keyboard. The present "universal" arrangement of letters on the keyboard and the custom of using all ten fingers to pound the keys are not approved by these French students of applied science.

How they are setting out for typewriter perfection is reported by J. M. Lahy, director of the psychological laboratory in the University of France, in a recent issue of "Industrial Psychology".

In the present standard keyboard, letters are grouped so that the ones most used are located where they are supposed to be easiest to reach, Prof. Lahy says. But the psychologists employed by a French typewriter company have for the past year

been studying typewriters hooked up to smoked drums, so that the speed of the typist in hitting the keys and the interval between hitting each two keys could be recorded permanently on smoked paper.

Statistical tables resulting from this work show that there is ordinarily a much shorter time interval between striking successive letters when they are on opposite sides of the keyboard, and consequently are hit with alternate hands. The two hands vary in this respect, however. The French investigators have found that the fingers of the right hand are more agile than those of the left, in the average operator. This means that whenever possible a letter hit by the left hand should alternate with one hit by the right.

French methods of typing are being developed as a result of the researches.

"The best methods are not to be obtained by imposing the same method on all typists," the French psychologist declares. "Each typist adapts a method to his own needs according to his muscular pecularities."

The usual method of typing taught, in which all ten fingers are used, rests upon an erroneous comparison of the finger movements of the typist with those of the pianist, he says.

GENERAL ADMINISTRATION OF IODINE THOUGHT UNSAFE

Is the consumption of iodized salt safe for the general public? According to such authority as Dr. Victor C. Vaughan of the National Research Council and Dr. C. L. Hartsock of the Medical Division of the Cleveland Clinic, it is not.

Dr. Hartsock has reported to the American Medical Association that the continuous administration of iodine over a long period of time should never be prescribed for adults. There are many different sorts of thyroid disturbances, according to Dr. Hartsock, and even small amounts of iodine are likely to set up irritation in certain types that are exceedingly dangerous.

"Iodine administered in small quantities, periodically to children", he says "under the age of puberty is a very efficient preventive of simple goiter. Community administration of iodine disregards physiologic facts regarding the effect of iodine on the thyroid gland. The use of iodized salt should be discontinued or limited absolutely to periodic table use by children under the age of puberty."

Dr. Vaughan maintains that the flood of iodized salt on the market is already doing harm.

"It should be understood," he says, "that there are different kinds of goiter and all kinds are not prevented, or, being present, are not benefitted by medication with iodine. The wholesale use of medicine of any kind or chemicals of any kind by the people without medical supervision is fraught with danger."

SLOW GAS LEAKS FOUND MENACE TO CHILDREN

Are your gas fixtures all tight? There is a definite cumulative poisonous effect from repeated or continuous exposure to even small amounts of the deadly carbon monoxide in illuminating gas. The acute cases of gas poisoning are dramatic and obvious, but according to Dr. A. M. Stevens, the danger from gradual poisoning is just as great, young children having been found particularly susceptible.

In a report to the American Medical Association he cites several cases of such slow poisoning in infants. He says that the cold weather and dark days of winter bring about a seasonal increase in the occurrence of these cases. Leaky gas jets, imperfect gas heaters and closed windows all contribute to their incidence. With the coming of spring and its attendant exodus out-of-doors there is an appreciable falling off.

These cases of gradual gas poisoning are difficult to recognize, says Dr. Stevens, and clinicians should be on the watch for it particularly in infants. In the serious cases tests will show as much as ten per cent. carbon monoxide in the blood while five per cent will accumulate in the blood of adults without their displaying any very obvious symptoms.

WHOOPING COUGH HELPED BY SIMPLE REMEDY

That old reliable remedy, sodium bicarbonate, is now recommended in the treatment of whooping cough.

Recent work of the Kingston Avenue and the Kings County Hospital Laboratories, Brooklyn, N. Y., by Drs. J. C. Regan and Alexander Tolstouhov shows that this familiar bane of childhood is accompanied by a condition of severe acidosis which may be counteracted by small repeated dosages of simple alkaline salts, such as sodium bicarbonate, calcium carbonate or magnesium oxide. In patients treated by this method early or late in the disease, a cure is induced.

Blood examination shows that the inorganic phosphorous content during whooping cough is lowered and the hydrogen ion concentration is greatly increased. The alkaline doses bring about a rapid return of the phosphorus to its normal proportion in the content of the blood and counteract the acidity. These chemical changes in the blood are accompanied by pronounced improvement in the patients so that vomiting ceased, according to Dr. Regan, on an average within one week and whooping within two weeks, with occasional exceptions. The patients generally showed corresponding improvement and increase in weight. It has been suggested that the characteristic symptom of vomiting in whooping cough is a compensating mechanism of the body to eliminate the excess acid.

Marquis wheat, now grown on 20 million acres of land, all comes from a single head produced by hybridization in 1903.

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HYDROCYANIC ACID MADE AS POWDER

Hydrocyanic acid, one of the most poisonous insecticides in use, can now be prepared in a stable powdered form. Since this efficacious bug killer has previously been available for trade purposes only in solutions that decompose in concentrations of any very great strength, the powdered form is regarded as a highly desirable improvement.

F. C. Metzger, in a report of his process for the production of this form of hydrocyanic acid to Industrial and Engineering Chemistry, says that the powder lends itself to all sorts of fumigating where dusting apparatus can be used. Dusting has likewise proved a most effective and penetrating method of treating fruit trees for various pests, and has to a certain extent replaced spraying.

Kept in air tight containers, powdered hydrocyanic acid remains stable at all ordinary temperatures, decomposing only on contact with moisture.

TABLOID BOOK REVIEW

THE HISTORY OF THREE-COLOR PHOTOGRAPHY; by E. J. Wall. Boston, 1925, The American Photographic Publishing Co., 747 pp.; $15.00.

To attempt to do justice to such an exhaustive work as this in a brief review is a hopeless task, but at least it can be said that this is the only thing of its kind in print. With the continually increasing number of motion pictures that are being filmed entirely in color, there is more interest in colorphotography than ever before. For the experimenter in photographic methods, this book would seem a necessity, for here are described all of the important processes now in use as well as those that have been proposed at times in the past. The thirty years or more that Mr. Wall has spent in studying the subject guarantee its completeness, and make it a book to beheartily recommended to anyone who wants to know what has been done and is being done in this interesting field.

HUMAN PHYSIOLOGY. By John Thornton; revised by William A. M. Smart (Third Edition). London: Longmans, Green and Co. 1926. $3.75.

Most textbooks on physiology are most discouragingly bulky, and correspondingly costly. This one represents an encouraging effort at condensation, though even at that it runs to nearly five hundred pages. It gets in an adequate treatment of all the standard materials, and the work of the reviser is especially evident in the sections on the ductless glands and the chemistry of the body. A more adequate discussion of the vitamins would be desirable, however.